

Work Sheet

Our Reference No. PT-1949001
 Applicants Name: Dialysis Solutions Inc.
 Serial No. 10/020,882
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Mass Balance for the components of dialysis composition.

Concentrate as specified contains:

g/L = gram / Litre

[NaCl] 90.72±9.0 g/L

[NaHCO₃] 28.35 ±2.8 g/L

[MgCl₂] 0.96±0.9 r/L

Molecular weights (MW): from periodic table in Merck Index specified in grams/mole

[Na] = 22.989768 g/mol

[Cl] = 35.4527 g/mol

[Mg] = 24.3050 g/mol

[HCO₃] = (1.00794+12.011+3*15.9994) = 61.01714 g/mol

To determine the ion concentrations in the dialysis solution

Breaking [NaCl] into its ion components by weight:

[Na] part: $90.72 / (22.989768 + 35.4527) * 22.989768 = 35.68692 \text{ g}$

[Cl] part: $90.72 - 35.68692 = 55.03308 \text{ g}$

Breaking [MgCl₂] into its ion components by weight:

[Mg] part: $0.96 / (24.3050 + 35.4527 * 2) * 24.3050 = 0.245066 \text{ g}$

[Cl] part: $0.96 - 0.245066 = 0.7149 \text{ g}$

Breaking [NaHCO₃] into its ion components by weight:

[Na] part: $28.35 / (22.989768 + 61.01714) * 22.989768 = 7.758409 \text{ g}$

[HCO₃] part: $28.35 - 7.758409 = 20.5915 \text{ g}$

Total Mass of ions per Litre of concentrated solution from above

[Na] : $35.68692 \text{ g} + 7.758409 \text{ g} = 43.44533 \text{ g}$

[Mg] : 0.245066 g

[Cl] : $55.03308 \text{ g} + 0.7149 \text{ g} = 55.74798 \text{ g}$

[HCO₃] : 20.5915 g

Using 80 ml (0.08L) of the solution added to 1 Litre of water the following content of in the dialysis solution will be achieved:

$$[\text{Mg}]: \frac{0.245066 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 24.3050 \text{ g/mol}} = 0.746 \text{ mmol} / \text{L} \text{ or } .75 \pm 10\% \text{ mmol/L}$$

$$[\text{CL}]: \frac{55.74798 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 35.4527 \text{ g/mol}} = 116.48 \text{ mmol} / \text{L} \text{ or } 116 \pm 10\% \text{ mmol/L}$$

$$[\text{Na}]: \frac{43.44533 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 22.989768 \text{ g/mol}} = 139.98 \text{ mmol} / \text{L} \text{ or } 140 \pm 10\% \text{ mmol/L}$$

$$[\text{HCO}_3]: \frac{20.5915 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 61.01714 \text{ g/mol}} = 24.998 \text{ mmol} / \text{L} \text{ or } 25 \pm 10\% \text{ mmol/L}$$

PERIODIC CHART OF THE ELEMENTS

KEY		Common Oxidation States →		Atomic Weight		Atomic Symbol	
1	H	1.00794	1	196.966569	79	Au	79
2	He	4.002602	2				
3	Li	6.941	3				
4	Be	9.012182	4				
5	B	10.811	5				
6	C	12.0107	6				
7	N	14.0067	7				
8	O	15.9994	8				
9	F	18.9984032	9				
10	Ne	20.1797	10				
11	Na	22.98976928	11				
12	Mg	24.304	12				
13	Al	26.9815386	13				
14	Si	28.0855	14				
15	P	30.973762	15				
16	S	32.06	16				
17	Cl	35.453	17				
18	Ar	39.948	18				
19	K	39.0983	19				
20	Ca	40.078	20				
21	Sc	44.955912	21				
22	Ti	47.867	22				
23	V	50.9415	23				
24	Cr	51.9961	24				
25	Mn	54.938045	25				
26	Fe	55.845	26				
27	Co	58.933195	27				
28	Ni	58.6934	28				
29	Cu	63.546	29				
30	Zn	65.409	30				
31	Ga	69.723	31				
32	Ge	72.64	32				
33	As	74.92160	33				
34	Se	78.96	34				
35	Br	79.904	35				
36	Kr	83.798	36				
37	Rb	85.4678	37				
38	Sr	87.62	38				
39	Y	88.90585	39				
40	Zr	91.224	40				
41	Nb	92.90638	41				
42	Mo	95.94	42				
43	Tc	98.9062	43				
44	Ru	101.07	44				
45	Rh	102.90550	45				
46	Pd	106.42	46				
47	Ag	107.8682	47				
48	Cd	112.411	48				
49	In	114.818	49				
50	Sn	118.710	50				
51	Sb	121.760	51				
52	Te	127.60	52				
53	I	126.90447	53				
54	Xe	131.29	54				
55	Cs	132.9054519	55				
56	Ba	137.327	56				
57	La	138.9047	57				
58	Ce	140.116	58				
59	Pr	140.90765	59				
60	Nd	144.242	60				
61	Pm	144.9127	61				
62	Sm	150.36	62				
63	Eu	151.964	63				
64	Gd	157.25	64				
65	Tb	158.92535	65				
66	Dy	162.500	66				
67	Ho	164.93032	67				
68	Er	167.259	68				
69	Tm	168.93421	69				
70	Yb	173.054	70				
71	Lu	174.967	71				
72	Hf	178.49	72				
73	Ta	180.94788	73				
74	W	183.84	74				
75	Re	186.207	75				
76	Os	190.23	76				
77	Ir	192.222	77				
78	Pt	195.084	78				
79	Au	196.966569	79				
80	Hg	200.59	80				
81	Tl	204.3833	81				
82	Pb	207.2	82				
83	Bi	208.98040	83				
84	Po	209	84				
85	At	210	85				
86	Rn	222	86				
87	Fr	223	87				
88	Ra	226	88				
89	Ac	227	89				
90	Th	232.0377	90				
91	Pa	231.03688	91				
92	U	238.02891	92				
93	Np	237.04817	93				
94	Pu	244.06422	94				
95	Am	243.06138	95				
96	Cm	247.07035	96				
97	Bk	247.07035	97				
98	Cf	251.07958	98				
99	Es	252.0833	99				
100	Fm	257.1037	100				
101	Md	258.1037	101				
102	No	259.1037	102				
103	Lr	262.1037	103				

Lanthanides		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Actinides		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Note: Atomic weights are based on the 2001 IUPAC Atomic Weights of the Elements and the 2005 Revised IUPAC Periodic Table of the Elements. Values in parentheses are used for certain radioactive elements; this value is the relative atomic mass of the longest-lived isotope of that element.

Note: Elements with atomic numbers 112 and above have been reported but not fully authenticated. * Symbol based on IUPAC systematic names.